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Surgeons General of the Past

(The twenty-sixth in a series of brief biographies)

Bartholomew William Hogan was born in West Quincy, Massachusetts on 29 January 1901, receiving his pre-medical training at Boston College and his medical degree from Tufts College Medical School in 1925 where he was awarded the Phi Lambda Kappa medal for highest achievement. He was appointed a Lieutenant (jg) in the Navy's Medical Corps on 6 June 1925, and advanced through the various grades becoming Rear Admiral 1 April 1952. In 1942 as Senior Medical Officer aboard the carrier USS WASP, he received the Silver Star medal for "heroic service" following the torpedoing of that vessel by Japanese submarines. In 1942–1943 he was in charge of establishing the V–12 Medical and Dental programs and later was C. O. of the Naval Medical School and Naval Hospital, Bethesda. After being Fleet Medical Officer for CincPac and CincPac Fleet in 1953–1954, Admiral Hogan was appointed Deputy Surgeon General and on 10 February 1955, the Chief of the Bureau of Medicine and Surgery and Surgeon General of the Navy. President Eisenhower reappointed him in 1959. Retiring in 1961, he became Deputy Medical Director of the American Psychiatric Association. During his two terms as Surgeon General, he instituted important policy changes in the Navy Medical Department which made Navy medicine more attractive as a professional career. Admiral Hogan has been Associate Professor of Psychiatry at Georgetown Medical School since 1935. He received honorary degrees from 5 universities, and was decorated by France, Peru and Sweden for his contributions to international medicine. He also received the Purple Heart, the Navy and Marine Corps Medal and President Kennedy bestowed the Distinguished Service Medal on him in recognition of his valuable service to his country and to Navy medicine.

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Policy

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The issuance of this publication approved by the Secretary of the Navy on 4 May 1964.

A SHORT HISTORY OF BLOOD TRANSFUSION

Corinne S. Wood, From the Riverside Community Hospital Laboratory, Riverside, Calif., Transfusion 7(4):299–303, July–August 1967.

Among the tribes of Central Australia a sick old man is given the blood of a young man to drink. Throughout South America the most popular method of driving out a bad spirit was by venesection in the belief that the demons escaped with the blood. The Egyptians anointed heads with oil containing blood to treat greying and baldness. They also used blood baths for resuscitation and recuperation while the Romans were said to have rushed into the gladiatorial arena to drink the blood of the dying as a method of imbuing their courage.

The Greeks believed that the most important of the four humors was the blood which was supposed to be manufactured by the liver and wine was considered by Galen as contributing greatly to its formation. This idea was still alive in the 16th Century when Christopher Marlowe wrote Tamburlaine the Great,

"Filling their empty veins with airy wine
That being concocted turns to crimson Blood."

After Galen showed that arteries are not air containers as their name implies, the Greeks believed that there were two systems of blood distribution: the liver dispensing it through the veins and the heart through the arteries. Along each artery and vein there was a regular ebb and flow, the blood rushing backward and forward along the same channel. This idea is perpetuated in the stories of Asclepius who received from Athena the blood that flowed from the veins of a Gorgon. He then used the blood that flowed from the veins of the left side for the bane of mankind and that from the right for their salvation. With the right sided blood he also raised the dead. But he began to resurrect so many that Hades complained to Zeus who, fearing that men might acquire the art of resurrecting each other, killed him with a thunderbolt.

While blood has been identified with life from the most remote antiquity, scientific, anatomical and physiological inquiries on circulation and blood awaited the coming of the 16th Century. The first recorded transfusion was performed in 1490 in Rome on Pope Innocent VIII who lay dying of old age. It was proposed to rejuvenate him by injecting the blood from three young, healthy boys into his veins. Although there is some question as to whether this blood was given intravenously or as a drink, there was an unquestionably 100 percent result—the boys died, the Pope died and the physician fled the country.

Another early transfusion was recorded by Denis in 1667 and involved a young man who had "fallen into a phrensy . . . occasioned by a disgrace he had received . . . in some amours." It was hoped that the calf's blood used for the transfusion ". . . by its mildness and freshness might possibly allay the heat of his Bloud." Unfortunately, the results of this effort are not recorded.

Fundamental discoveries of this period were part of a scientific renaissance characterized by a rebellion against the Galenic tradition and leading to the foundation of scientific societies beginning with the Academia dei Lincei in Rome in 1603. Vesalius in 1543 typified the new movement as one of the first students of anatomy to turn to the body itself rather than ancient authority as a source of anatomical knowledge. Caesalpinus (1519–1603) anticipated the basic principles of circulation. William Harvey studied in Padua and continued his work on returning to England leading to the publication of "Exercitatio de Motu Cordis" in 1628, a milestone in the progress of human knowledge. He proved without question that the blood does circulate, that its movement is purely mechanical, produced by the heart, which is simply a pump.

The discovery of the microscope sometime around 1650 made possible the recognition of red cells by Jan Swammerdam in 1658. A few years later, Marcello Malpighi discovered the capillary circulation of the lung and also described red blood cells. In 1680 Giovanni Borelli advanced the knowledge of circulation by demonstrating the mechanism of

the steady flow of blood from the arteries through the capillaries and into the veins. Leeuwenhoek had already contributed his lenses for exhaustive examination of many things including red cells which he used as a standard of size.

The first definitive recognition of the relationship of the red cells to respiration was not to come for another century when Lavoisier in 1777, two years after the discovery of oxygen, described the nature of oxidation and identified the process with respiration. He postulated that oxidation took place in the lungs, at the expense of a substance secreted in the lungs and containing Carbon and Hydrogen. In 1747 Menghini showed iron was present in the ash of the erythrocytes.

At the beginning of the next century, the 19th, Hoppe-Seyler demonstrated the oxidation-reduction potential of hemoglobin but it was not until the middle of that century that a burst of activity occurred marked by Reichert's crystallization of hemoglobin; Justus von Liebig's accurate hypothesis that red cells contain a compound of iron which can combine with oxygen or carbon dioxide in a reversible reaction; and Neumann's and Bizzozero's simultaneous and independent discovery of the hemopoietic function of the bone marrow.

At the end of the 19th Century technics were developed for measuring red cells, total blood volume and hemoglobin values. But these important studies were still accompanied by the wildest sort of experimentation on the part of many people who attempted to inject almost anything injectable into the blood streams of man and animals.

The actual technic of transfusion was not new—Christopher Wren and Richard Lower performed a successful transfusion in 1665 by uniting the artery of one dog to the vein of another by means of a hollow quill. In 1667 Lower transfused a healthy but mildly insane man with the blood of a lamb. The procedure was demonstrated before the London Royal Society and described thus in Pepys' diary: "With Creed to a tavern and a good discourse among the rest, of a man that is a little frantic that the College had hired for 20 shillings to have some blood of a sheep let into his body." And on November 30 he wrote, "I was pleased to see the person who had had his blood taken out. He did thus give the Society a relation thereof in Latin, saying that he finds himself better since but he is cracked a little in his head." Later Pepys wrote, "It gave rise to many pretty wishes as of the blood of a Quaker to be let into an archbishop and such like."

Using the blood of an animal was the dominating idea of the time in the belief that the characteristics of the animal would be engrafted upon the human recipient and perhaps a criticism of mankind is implied in the usual choice of lamb's blood. The patient was invariably bled before he was transfused, the purpose being to remove bad blood to let in the good.

At Montpellier, a boy sick with fever and weakened by many blood lettings was transfused by Jean Baptiste Denis, physician to Louis XIV. The boy was given about half a pint of lamb's blood and apparently recovered although one wonders whether the cessation of the blood-letting played a more important role than did the transfusion—in the light of present day knowledge of immunological processes, it is unlikely that the blood could have survived long enough to be of any value.

The disease conditions selected for the early trials of transfusion were insanity, advanced lung and bowel afflictions and particularly the debilitations of old age—never for the logical reason—acute loss of blood. The reactions must have been severe and probably the only reason most were not fatal was the fact that very small quantities of blood were used. At least one of Denis' transfusions did prove fatal and he was charged with murder. After a long, legal battle, he was exonerated but was in such disrepute that he and transfusions were banned, supposedly forever, by the Faculty of Medicine in Paris. Shortly thereafter the English Parliament and the Roman magistrates followed suit.

Not until the 19th Century was transfusion again proposed. James Blundell, an English obstetrician, devised an apparatus for performing transfusions and saved a number of postpartum hemorrhagic patients. He used only human blood injected with a syringe but failed to save the first four women. Eventually he resuscitated several who had lost so much blood that death seemed certain.

Blundell's are the first transfusions with some claim to be considered beneficial to the patient. He wrote, in 1829, "Although the patient received only eight ounces in three hours, she felt as if life were infused into her body." It is still in cases of acute hemorrhage that transfusion produces its most dramatic results. Severe incompatible reactions were a real deterrent. Ignorance of the antigenic con-

stitution of human and animal blood kept transfusions at near primitive levels.

Nevertheless, during the third quarter of the 19th Century the frequency of transfusion increased. During this time 347 transfusions of human blood are recorded and 129 cases in which the blood of various animals was used. In 1869 Creite showed that red cells of man would clump together if placed in the serum of a cat, dog, or sheep. Within a few years Landois discovered that when the red cells of a lamb were mixed with the serum of a dog and incubated at 37 C they would lyse within two minutes. These phenomena are known now to be responsible for reactions that occur in recipients of blood. However, while the increasing knowledge of physiology discouraged interspecies transfusion, the lack of knowledge of blood groups within man resulted in severe reactions and frequent fatalities so that transfusion remained a hazardous procedure used only as a last resort. By the opening of the 20th Century, new and more practical apparatus was devised but transfusion of blood was virtually abandoned in favor of injection of isotonic salt solutions.

In 1900 Ehrlich and Morgenroth found that by injecting red cells from one goat to another they could provoke the formation of hemolytic antibodies, "iso-hemolysins." The following year Landsteiner found that in humans there were naturally occurring antibodies, "iso-agglutinins," which would react with the red cells of certain other human subjects. It was mainly for this work that Landsteiner received the Nobel prize in 1930. Soon systems for classifying people on the basis of blood groups were established, as well as methods for determining whether a given donor's blood and a given recipient will be compatible. For the first time blood transfusion could be approached scientifically.

But it was still an approach—much remained and remains before transfusion could be considered without trepidation. After the discovery of the ABO system in 1901 no new blood group systems were found for 25 years. The antibodies M and N were found in 1928 by Landsteiner and Levine by injecting human red cells into rabbits.

Landsteiner and Wiener in 1940–41 adopted a slightly different approach when they injected the red cells of rhesus monkeys into rabbits and tested the resulting serum against human blood. They hoped that in this way they might reveal the existence of an antigen present both in rhesus cells and in human cells and they were successful.

At about this time Levine and his colleagues were making their highly important discoveries relating iso-immunization and pregnancy. In 1939 they found an antibody which subsequently proved to be anti-Rh_o in the serum of a recently delivered woman whose fetus had died *in utero*. Eventually it was shown that the mother had been immunized by the red cell antigen (Rh_o) which her fetus had inherited from its father. Later work disclosed that the antibodies produced against fetal red cell antigens were able to cross the placental barrier and, if the titer were high enough, caused severe hemolysis of the baby's blood. Thus the incompatibility of the baby's and the mother's blood acted in much the same way as an incompatible blood transfusion would have done. Much additional work has made possible the prevention of erythroblastosis fetalis or hemolytic disease of the newborn through the ability to predict its probable occurrence and when necessary exchange the baby's blood with compatible donor blood.

In general the need for transfusion is not so much because of the formed elements of the blood as because of the physical effects of the diminished volume of circulating liquid upon the blood pressure. The First World War saw a push to make blood transfusion available to soldiers who had lost blood in battle, but it was not until World War II that the present type blood bank operation developed on a large scale. In the Fall of 1944, during the later stages of the war, blood drawn on the Atlantic seaboard and flown to Europe could be circulating in the veins of a wounded soldier the following day. Processes were developed for the safe preservation of blood and its fractions, including drying of blood plasma. During the four-and-one-half years of the war the American Red Cross collected over 13,326,000 units of blood.

Tarasov has recently reviewed 30 years of experience at the Sklifossovsky Institute in Moscow, involving more than 30,000 transfusions of blood taken from cadavers. Suitable donors are victims of sudden cardiac arrest, e.g., myocardial infarction, hypertensive heart disease, electric shock. Victims of accidents involving tissue injuries are not suitable. They found that in subjects who have died suddenly, blood obtained by venesection flows out in the liquid state; it clots after 20 to 30 minutes, but 30 to 90 minutes later it becomes liquid again due to fibrinolysis. Two to four liters of blood are obtained from the jugular veins of the cadaver without addition of anticoagulants. The blood is

said to be suitable for transfusion after storage at 4 C for a period up to 25 days.

Many important scientific by-products have come about as a direct result of the work done to make transfusion a safe procedure. The possible relationship of blood groups with varying susceptibility to some diseases has been reviewed by Mourant. He states that while transfusion reactions and hemolytic disease are direct and in a sense predictable results of immunization followed by the combination of antigen and antibody, there are other clinical effects of the blood groups which are observed empirically but which at present cannot be explained serologically. There are the increased susceptibility of persons of one or another blood group to particular diseases: of group A persons of both sexes to carcinoma of the stomach, pernicious anemia and diabetes mellitus; of group A women to genital carcinoma; and of group O persons to duodenal and gastric ulcers.

These phenomena may be described as pleomorphic effects of the blood group genes concerned. Most of the diseases, he points out, are associated with the gastrointestinal tract and it may be that susceptibility is related to the presence and distribution of blood group substances in the organs concerned and to the secretion of these substances into their lumina.

This hypothesis is supported by the fact that duodenal ulcer, at least, is commoner in nonsecretors of the ABO substances than in secretors. There can be little doubt that these differing susceptibilities to disease must have a selective effect, as does hemolytic disease of the newborn. Roberts suggests that such selection is probably responsible for the varying distribution of the blood groups of all systems which we find in the world today. He notes that the ABO groups, which appear to have more effect on susceptibility to disease than do those of the other systems, show a much more uneven distribution. He postulates that the varying distribution is the result of rapid and natural selection, while the distribution of the other blood group systems is the integrated effect of selection—perhaps genetic drift operating over very long periods.

The first planned study of the incidence of the blood groups in different populations was carried out by Hirszfeld and Hirszfeld in 1919 at Salonica at the end of World War I. Since this first study further observations have been published at a steadily increasing rate, based mainly on the records of transfusion services in different countries. Many thousands of observations have now been published and, as of 1959, information concerning blood groups has been gathered from some six million persons.

In addition, intensive chemical studies have shown that human blood group substances ABH and Lewis [a] all consist of the same four sugars L-fucose, D-galactose, N-acetylglucosamine, N-acetylgalactosamine and eleven amino acids arranged in different ways.

A great deal has been learned of the blood groups present on the cells and in the serum of other animals. Those of the primates have been of particular value in helping to establish phylogenetic relationships.

Much of the work on blood groups has been of great value to immunological studies and has exposed some of the problems involved in the rejection by the body of attempted tissue and organ transplants. The blood is still the only organ of which enough is known so that it can be successfully and regularly transferred from individual to individual with reasonably predictable results. Eventually this knowledge will surely be expanded so that almost any diseased organ can be replaced. Before that can be done much more immunological information has to be obtained, but the start has been made by those whose work has been reviewed in this brief survey of the 350-year history of blood transfusion.

(The references may be seen in the original article.)

VENEREAL DISEASE CONTROL IN THE 2ND MARINE DIVISION, CAMP LEJEUNE, NORTH CAROLINA

LCDR Paul C. White, Jr., MC USN and Joseph H. Blount, MPH** Milit Med 132(4):252–257, April 1967.*

Introduction

Venereal disease has always posed a problem for the military and currently, with the rapid build-up of our armed forces and deployment of large numbers of troops overseas, this problem can be expected to assume greater proportions.

In the United States reported case rates for infectious syphilis in the civilian population have increased from an all-time low of 3.8 cases per 100,000 in 1957 to 12.2, in 1965. Reported cases of gonorrhea have followed a similar trend to that of primary and secondary syphilis with a high of 169.3 cases per 100,000 being reported for calendar year 1965, with an estimated 1.5 million new cases of gonorrhea occurring annually.[1]

The Control Program

Camp Lejeune is a large Marine Corps base located at Jacksonville, North Carolina, which is 55 miles north of Wilmington, on U.S. Highway 17 and it is the home of the 2nd Marine Division (2d MarDiv). The venereal disease control program of the Division is conducted by the Preventive Medicine Section. All patients having venereal disease other than syphilis are interviewed by the Preventive Medicine technicians. Those patients having syphilis are interviewed by a representative of the State Board of Health who is stationed at the local county health department. Within the Division, there is a serology laboratory where all VDRL and darkfield tests are performed. Only qualitative VDRL's are performed at Camp Lejeune, and all reactive sera are sent to the state laboratory in Raleigh for retesting with a quantitative VDRL and FTA. It was felt that a central laboratory in the Division for performing all darkfield examinations would provide a higher degree of skill in diagnosis rather than having them performed in the individual battalions. It is important to note that this procedure also assures the reporting of all venereal disease cases diagnosed in the 2d MarDiv.

The 2d MarDiv Preventive Medicine Officer renders consultative service to the medical officers of the Division. This has been found to be especially important as most of the medical officers have been found to be lacking in knowledge regarding the diagnosis, treatment, and control of venereal disease. This lack of knowledge regarding venereal disease is the result of the de-emphasis of time allotted to the teaching of venereal disease in the curriculum of most medical schools and in residency training.

An analysis of data for the calendar year 1965 will be presented. In addition, supplemental data for the period March–August 1966 will also be included.

Results

During the calendar year 1965, a total of 67 cases of syphilis occurred (60 primary or secondary and 7 early latent) and 376 cases of gonorrhea. All cases were between 17 and 35 years of age, with 82.1 percent of the syphilis and 90.2 percent of the gonorrhea occurring in the group 18–24 years of age. (Table I.)

TABLE I.—Venereal Disease Cases—By Age
Camp Lejeune, North Carolina
Calendar Year 1965

Age	Primary, Secondary and Early Latent Syphilis	Gonorrhea
17	—	10
18	8	49
19	15	45
20	8	76
21	8	65
22	9	64
23	4	23
24	3	17
25	2	7
26	2	8
27	4	3
28	1	3
29	—	1
30	1	—
31	—	3
32	1	—
33	—	1
34	—	1
35	1	—
Total	67*	376

* 55 primary, 5 secondary, and 7 early latent syphilis.

*Present address, 308 Creon Ct., Jacksonville, N. C. 28540.

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TABLE II.—Venereal Disease Cases and Rates per 100,000 Population
Camp Lejeune, North Carolina and United States
Calendar Year 1965

	Primary and Secondary Syphilis	Early Latent Syphilis	Gonorrhea
Camp Lejeune, North Carolina			
Cases	60	7	376
Rates/100,000 average strength	313.3	36.6	1963.4
*Total Military Cases Reported to Public Health Service in the United States**			
Cases	900	274	19,995
Rates/100,000 (estimated)	46.7	14.2	1037.1
*United States Civilian Rates per 100,00 population**			
Total Rate	12.2	9.1	169.3
Total Male Rate	15.4	10.5	263.1
Rate for Males age 20–24	68.9	Not Available	1523.3

* Source: Communicable Disease Center, Venereal Disease Branch, U. S. Public Health Service, Atlanta, Georgia.

The number of venereal disease cases and rates per 100,000 population for the 2d MarDiv, total military cases, and civilian case rates in the United States are shown in Table II. Although the 2d MarDiv comprises less than 1 percent of the total military population stationed in the United States, it reported 6.7 percent of the military primary and secondary syphilis, 2.6 percent of the military early latent syphilis, and 1.9 percent of the military gonorrhea cases reported by all the armed forces in the United States. The primary and secondary syphilis case rate for the 2d MarDiv is 313.3 per 100,000 as compared to 15.4 for the total civilian male population of the United States. The primary and secondary syphilis case rate observed in the 2d MarDiv is four and one-half times higher than the highest age specific case rate observed among civilian males in the United States (313.3 per 100,000 in the 2d MarDiv compared to 68.9 per 100,000 for civilian males in the 20–24 year age group). In comparing the gonorrhea case rates for the same age group, there is not such a pronounced difference, the rates being 1963.4 for the 2d MarDiv and 1523.3 for the civilian population.

TABLE III.—Syphilis Cases Diagnosed, Total Number Contacts Named, and Number of Contact Forms Initiated
Camp Lejeune, North Carolina
Calendar Year 1965

Stage of Syphilis	Number of Cases Diagnosed	Total Number Contacts Named	Contact Forms Initiated	
			Number	Percent
Primary	55	236	93	39.4
Secondary	5	21	6	28.6
Early Latent	7	61	20	32.8
Total	67	318	119	37.4

Although the interview of 67 early syphilis cases revealed a total of 318 contacts, only 119 (37.4 percent of total) contact forms were initiated (Table III). Contact forms were not initiated on many contacts because of insufficient information concerning identification or location of the contacts. Three of the cases were not interviewed because of transfer from the organization, and 10 had no contact forms initiated because of insufficient information. The remaining 54 cases had one or more contact forms initiated. Of these, 31 contact forms were initiated in North Carolina with 27 examined; 35 initiated for the remainder of the United States with 24 examined; and 53 initiated overseas with none receiving a disposition (Table IV).

Excluding the overseas contacts, 51 of 66 (77.3 percent) contact forms initiated from Camp Lejeune that were investigated in the United States resulted in the examination of the contact. The percent of contacts examined from Camp Lejeune was higher than the national average of 66.8 percent.[2]

TABLE IV.—Number of Early Syphilis* Cases Diagnosed, Number Interviewed, and Number Contacts Examined
Camp Lejeune, North Carolina
Calendar Year 1965

1. Number of Early Syphilis cases diagnosed	67*
a. Number not interviewed	3
b. Number with no contact forms initiated	10
c. Number with one or more contact forms initiated	54**
2. Number contact forms initiated for item 1c	119
a. Number contact forms initiated in N.C.	31
Number examined	27
b. Number contact forms initiated outside N.C., but in United States	35
Number examined	24
c. Number contact forms initiated for overseas	53
Number examined	0

* Primary (55), secondary (5), and early latent (7).

** Includes 28 patients naming only contacts (45) in the United States.

Syphilis was identified in 5 of the 51 (9.8 percent) contacts examined. (Four cases of secondary and one case of early latent syphilis were identified.) On a national basis, syphilis was identified in 23.1 percent of the military contacts examined.[2]

Venereal disease infections were classified by the type of leave granted. Type of leave (overnight, weekend, leave, and overseas) is based on the distance in miles one is allowed to travel from camp, with the exception of the overseas category. The number of syphilis infections was about equally distributed between the leave categories, with the exception of weekend leave which has the lowest number of infections. The largest number of gonorrhea infections was acquired while on overnight leave. These results may be related to the incubation period of the diseases and what medical facilities are available when the signs and symptoms appear (Table V).

The locations of syphilis contacts were distributed between 12 states and 11 countries or areas outside the United States (Table VI).

Discussion

The 2d MarDiv reports a greater percentage of venereal disease, particularly infectious syphilis, when compared to the remainder of the armed forces in the United States, as well as the civilian population. Several factors that may influence this high rate are the relative isolation of the base which is some 55 miles from the nearest large city and the high mobility of the military groups involved. All new replacements are sent to Camp Lejeune directly from eight weeks of boot camp without leave and receive an additional two to three weeks of training before being allowed leave. The Division has three battalions of men deployed overseas at all times. In addition, there are many men returning from Southeast Asia. This situation poses a problem in the control of syphilis as is indicated by the fact that overseas contacts accounted for 31.3 percent of the syphilis cases during 1965. This figure would undoubtedly be much higher if information were available on all contacts. Contacts were listed in 11 different countries or areas outside the United States.

A relatively small number of contact forms were initiated (119 of 318 forms) with only 51 contacts examined and 5 cases of infectious syphilis identified. Such a poor response may in part have been due to the mobility and transitory nature of the popula-

TABLE V.—Venereal Disease Cases Reported by Type of Leave, Camp Lejeune, North Carolina
Calendar Year 1965

	Type of Leave				
	Overnight	Weekend	Leave	Overseas	Total
(Miles from camp)	(0–50)	(50–400)	(400+)	—	—
Diagnosis					
Primary, Sec. or E. L. Syphilis	19	6	21	21	67*
Gonorrhea	145	126	71	34	376

* 55 primary, 5 secondary, and 7 early latent.

TABLE VI.—Location of Contacts to Early Syphilis Cases, Classified by Type of Leave
Camp Lejeune, North Carolina
Calendar Year 1965

Location of Contact	Number Contacts Initiated by Type of Leave and Contact Location			
	Overnight	Weekend	Leave	Overseas
Florida			3	
Georgia		2		
Illinois			1	
Louisiana			1	
Massachusetts			2	
New York			7	
North Carolina	30	1		
Pennsylvania			14	
Tennessee			1	
Texas			1	
Virginia		1		
West Virginia			2	
France				3
Italy				2
Mexico				1
Netherland Antilles				1
Okinawa				7
Philippine Islands				4
Portugal				3
Puerto Rico				18
Santo Domingo				3
Spain				6
West Indies				5
Total (119)	30	4	32	53

tion involved, which resulted in a lack of adequate information concerning identification and location of contacts, both overseas and out-of-state. Receipt of a "no disposition" on contacts may have been due to lack of communication, insufficient numbers of investigators or lack of administrative control.

The "interstate Communication Control Record" is a procedure initiated by the Venereal Disease Branch of the Communicable Disease Center in July 1966, which should alleviate this problem in the United States. Its function is to facilitate better communication and administrative control to obtain a disposition on contacts sent to other states or outside of the country. In addition, this procedure should provide information needed in pinpointing syphilis problem areas outside of the United States. Overcoming these obstacles presents us with a great challenge that must be met to effectively reduce the spread of syphilis infection in the military as well as in the civilian population.

An unusually large number (55 of 67) of the reported cases of early syphilis were diagnosed in the primary stage. In an effort to determine the reasons for such a large number of cases being diagnosed in the primary stage at Camp Lejeune, patients were asked why they sought treatment.

Twenty-six cases of early syphilis were reported during the period 15 March 1966 to 24 August 1966 and were included in a study to determine the reasons for diagnosis of reported early syphilis. Twenty-five (25 of 26) cases were primary and diagnosed by darkfield whereas only one (1 of 26) was reported as early latent on the basis of serology. Of the 25 primary cases, 24 (96.0 percent of the total primary) availed themselves voluntarily at routine sick call because of lesions and one was brought in for examination after having been reported as a contact. The remaining case, early latent, was diagnosed as a result of a reactive serology taken at the time of separation from the service. In the United States, only 45 percent of the civilian primary syphilis cases voluntarily seek medical examination.

Military personnel are aware of the early signs and symptoms of syphilis and of the importance of seeking medical attention as quickly as possible, as

demonstrated by the large number of military personnel who availed themselves voluntarily for early treatment during the primary stage of syphilis. It is felt that the venereal disease education program for the military, the availability of medical facilities and the free medical care were contributing factors.

Summary

For the year 1965, a total of 67 cases of syphilis and 376 cases of gonorrhea were reported in the 2d Marine Division. The Division, although comprising less than 1 percent of the entire military population stationed in the United States, reported 6.7 percent of all primary and secondary syphilis, 2.6 percent of all early latent syphilis, and 1.9 percent of all gonorrhea cases reported by the entire armed forces stationed in the United States. The primary and secondary syphilis case rate for the 2d Marine Division is 313.3/100,000 as compared to 15.4, for the total civilian male population of the United States, or 68.9/100,000, for the highest civilian male age specific group (20–24 years of age) of the United States. Sixty-seven patients with infectious syphilis named 318 contacts. However, inadequate information for identification and location of contacts reduced the number of contact forms initiated for investigation to only 119. Of the contact forms initiated, the contacts were located in 12 states, 11 countries or areas outside the United States. Venereal disease infections and location of contacts were classified by type of leave (distance in miles one is allowed to travel on leave). Weekend leave revealed the lowest number of syphilis infections with the larger number of gonorrhea infections being acquired on overnight leave.

Patients diagnosed as primary syphilis at Camp Lejeune voluntarily sought medical examinations twice as frequently as did those patients diagnosed in the primary stage in the civilian population.

The earlier an infected individual suspects a primary lesion, seeks medical examination, receives treatment, and his contacts are brought to medical attention, the more effectively can the spread of syphilis be prevented.

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GYNECOMASTIA ASSOCIATED WITH LUNG CANCER*

Mortimer R. Camiel MD, David L. Benninghoff MD, and Leslie L. Alexander MD,

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The association of gynecomastia with lung cancer has been documented, but the pathogenesis of the relationship remains unexplained. The precise incidence is unknown. Stephens reported 7 percent of 156 cases of bronchial carcinoma with gynecomastia.

Overt gynecomastia is a non-specific sign and has been noted in a wide variety of disturbances. Excluding its most common cause, pubertal hormonal imbalance, the more notable of the illnesses in which it may be observed or with which it may be associated are respiratory diseases of almost any type, liver disease, malnutrition, testicular disease and tumors, endocrine disturbances and tumors, heart disease, diseases of the spinal cord and nerves, diabetes, and the administration of certain drugs such as stilbestrol and digitalis. The finding of clinically overt gynecomastia in these various conditions, while not specific, is nonetheless in each instance an indication, no matter what the mechanism, of unusual hormonal activity or of target or end-organ activity.

A search for gynecomastia among our lung cancer patients readily resulted in many examples. The following are examples of lung carcinoma associated with gynecomastia.

Case Reports

Case 1: C.L. was a 74-year-old man with chest pain and weight loss of 15 pounds over two months. He had marked gynecomastia. Roentgenograms re-

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vealed a large tumor in the left upper lobe. Sputum studies were class V, conclusive for malignancy.

Case 2: R. S. was a 55-year-old man with a two month history of increasing weakness, cough, hemoptysus, anorexia and weight loss. The breasts were of asymmetrical size. There was incipient gynecomastia on the right and definite gynecomastia on the left. Roentgenograms showed a density in the left hilum with a small pleural effusion on the same side. Sputum studies were class V, conclusive for malignancy with the cytology consistent with oat cell carcinoma.

Case 3: G. B. was a 67-year-old man diagnosed one and a half years previously as having a bronchogenic carcinoma on the basis of chest roentgenograms and class V sputum cytology, conclusive for malignancy. He was suffering from superior vena caval syndrome, bilateral arm edema, worse on the right, with edema extending over the chest wall, and associated bilateral gynecomastia, worse on the right.

Case 4: J. M. was a 67-year-old man with a four-month history of dyspnea, 30-pound weight loss and progressive dysphagia. A mass occluding the right main bronchus was seen on bronchoscopy and biopsy revealed epidermoid carcinoma. He had definite gynecomastia in one breast.

Discussion

In seeking an explanation for the association of gynecomastia with lung cancer, several hypotheses present themselves: (1) the lung tumor itself produces an hormonally active substance; (2) the presence of a tumor in the lung causes the lung to produce such a substance; (3) the lung tumor initiates a neural or neurocirculatory reflex resulting in specific end-organ responses; (4) gynecomastia is a non-specific host response to stress or disease; (5) the gynecomastia and lung tumor are together or separately manifestations of some unknown factor producing the neoplasia. It would be fruitful to examine these hypotheses.

The lung tumor itself produces an hormonally active substance causing gynecomastia. There is increasing evidence to associate a variety of neoplastic states with the elaboration of polypeptide or protein substances having hormonal activity. Samples from bronchogenic malignant tumors have, for instance, been demonstrated to contain adrenocorticotropic material. While the "sine qua non" in establishing a non-endocrine tumor as the source of an endocrine substance is the actual demonstration by assay of such endocrine material in tumor tissue obtained at operation or necropsy, nonetheless, as stated by Liddle *et al*, there is "evidence that various non-endocrine tumors elaborate substances, which like conventional hormones, are carried by the bloodstream to other tissues where they exert biologic effects." Steigbigel *et al* suggest that the ability of tumor tissue, not commonly considered to be endocrine in function, to elaborate hormonally active proteins or polypeptides "may be a manifestation of the relative lack of differentiation and thus of multipotentiality of neoplastic growths." In any case, there are certain target or end-organ responses, such as gynecomastia, as reported in these four patients, which are generally accepted as evidence of unusual hormonal activity.

It is now well known that the neoplasms may produce systemic and distant manifestations not solely explained by their locations or physical contours. Bronchogenic malignant tumors particularly excite such responses and the following conditions are among those which have been described in association with lung malignancy: Cushing's syndrome, hyperadrenocorticism, inappropriate secretion of antidiuretic hormone, parathyroid hyperplasia, hypercalcemia, hyperphosphatemia, cerebellar cortical degeneration, peripheral neuropathy, leukoencephalopathy, arthritis, osteoarthropathy, scleroderma, thrombophlebitis, fibrinolytic purpura, cryofibrinogenemia and gynecomastia. Of these, many are of obvious hormonal origin. Many are examples of the so-called humoral syndromes associated with neoplasia. With gynecomastia, however, the precise causal relationship to endocrine substances produced within non-endocrine lung tumors has not yet been demonstrated. One can only conjecture that a still unidentified factor within lung tumor may exist.

(Since this was written, Fusco and Rosen reported gynecomastia associated with lung cancer in four patients. Bioassay of three of the lung tumors revealed gonadotropin production by the tumors. These authors, however, do not claim that this is the invariable pathogenesis since they also describe another patient with gynecomastia, hypertrophic pulmonary osteoarthropathy and lung malignancy whose tumor, on bioassay, showed no gonadotropic activity.)

The presence of a tumor in the lung activates the lung to produce a still unknown factor, one end-

product of which is gynecomastia. When the great variety of pulmonary diseases described in association with gynecomastia is considered, the possibility that the endocrine system, or certain end-organs, like the breasts or bones or finger tips, are being affected by some unknown pulmonary factor or factors also at work with lung tumors, gains credence.

Brambilla, Epstein and Kupperman believe that the endocrine system may be affected by such an unknown pulmonary factor. They report the case of a prepubertal girl who had intermittent precocious breast development each time she suffered a bout of mild bronchitis. All signs of breast development disappeared each time the pulmonary manifestations of bronchitis disappeared. In their search of the literature they found 22 instances of pulmonary neoplasia with gynecomastia in which the appearance of the breast enlargement correlated with the appearance or progression of the tumor. Others have reported instances in which the gynecomastia subsided as the state of the pulmonary neoplasm improved with therapy. Brambilla *et al* list the following pulmonary diseases which have been noted in association with gynecomastia: carcinoma of the lung, tuberculosis, bronchiectasis, lung abscess, ruptured hydatid cysts, spontaneous pneumothorax, gunshot wound of chest, nonspecific tracheobronchitis, polycystic lung disease, bronchiectasis with emphysema, empyema and nonspecific pulmonary infection.

Thus, the increasing recognition of the association of gynecomastia with a variety of pulmonary diseases gives weight to accepting it as a nonspecific manifestation of pulmonary disease, in the same sense that clubbing, another nonspecific sign, may be a concomitant of respiratory disease.

The presence of a tumor in the lung initiates a neural or neurocirculatory reflex resulting in specific end-organ response such as gynecomastia. Krahl has confirmed the presence of muscular mechanisms controlling the precapillary arteries of the lung and has shown the regulatory influence of the vagus on these muscles. Although poorly understood, these neurovascular reflexes, strongly linked by the vagus, may be the clue to the association of gynecomastia and lung tumors. This neurogenic mechanism is strongly supported by the observation that vagotomy may cause a reversal of the gynecomastia and a remarkable and almost immediate relief from the pain of osteoarthropathy.

The simultaneous relief from both complaints suggests that the same factors are at work in their pathogenesis. The same pathogenesis is also suggested by the appearance of either gynecomastia or osteoarthropathy in a multitude of similar pulmonary diseases. Possibly some of the hypotheses concerning pulmonary osteoarthropathy may be applicable to gynecomastia.

Cudkowicz and Armstrong suggest that in a wide variety of pulmonary diseases associated with clubbing of the digits, a uniform pulmonary circulatory disturbance exists in the nature of precapillary bronchopulmonary anastomoses. The mechanism by which these anastomoses are related to clubbing is not known, but the intimate neural relationships to the vasculature may furnish a reflex pathway through which the phenomenon is initiated. Flavell states that the abrupt abolition of arthralgia when a lung neoplasm is resected argues against a toxic theory of causation since toxins would presumably continue to circulate for some time after the growth's removal. He favors an "autonomic nervous reflex" theory. Holling, Brodey and Boland found osteoarthropathy to be associated with increased blood flow in the limbs of both men and dogs, and this hyperemia could be promptly reduced by procedures which are followed by regression of the signs and symptoms of osteoarthropathy. These authors also favor a neurogenic element in the pathogenesis of osteoarthropathy. They refer to the prompt regression of signs and symptoms after vagotomy which was supported by their own finding in a dog with bilateral lung metastases in which bilateral cervical vagotomy was followed by prompt reduction in limb bloodflow while unilateral vagotomy had proved ineffective. They believe that underlying the pulmonary osteoarthropathy is a reflex in which afferent fibers travel in the vagus nerve. In those cases where the patient improves after removal of the lung tumor, it is because the source of the afferent impulses is removed. When modified surgical procedures are helpful, it is probably because the afferent vagal fibers have been cut during the lung root dissection.

Thus there is increasing evidence to support a neurogenic phenomena at work in the pathogenesis of both osteoarthropathy and gynecomastia in lung disease. Vagal pathways are strongly implicated. Most importantly, patients with lung cancer may, in some circumstances, be substantially palliated by vagotomy.

Possibly related to neurocirculatory changes is the observation made by Sommers that changes in mammary blood flow may affect breast size. He found the male breast atrophied with healed myocardial infarction, probably because of decreased mammary vascularity, although he also includes the possibility of estrogen deficiency.

Gynecomastia is a nonspecific host response to stress or disease. The interesting coincidence of clubbing of digits and gynecomastia has been observed by us in at least one instance where the lungs were not involved. A young drug addict developed acute hepatitis following the use of a contaminated hypodermic needle. Following this, he developed both gynecomastia and clubbing of digits, indicating that there are factors, other than neoplastic or pulmonary which may initiate the phenomenon. Ginsburg and Brown found no correlation between the presence of gynecomastia and urinary estrogen levels. Their findings support the view that feminizing changes in men are not simply related to estrogen factors, but may depend on other factors. It is probably wise to assume that some still unknown factor or factors exist which can initiate gynecomastia, clubbing, or both, as manifestations of host or tissue response to tumor, infection, pulmonary disease or endocrine disturbance. Homberger states that it "is probable that the presence of a neoplasm in the human organism calls forth a number of adaptive and defensive responses of the body, most of which are not well known. Many of these responses may be unspecific, representing merely another instance of response and adaption to stress."

The gynecomastia and lung tumor are together or separately manifestations of some unknown factor producing the neoplasia. It is intriguing to consider whether the lung carcinoma itself is not one of several manifestations of some systemic factor, another of which is unusual end-organ activity such as proliferate changes in the breast. Rush and Kramer serial-sectioned both breasts of 20 women, all over 70 years of age, deceased from various causes. None with endocrine disease or treatment was included. Seven of the 20 patients had extramammary cancer and of these, all showed active proliferative changes in the breasts. Of the 13 remaining, only six showed active proliferation. Intraductal carcinoma, associated with benign and atypical hyperplasia of significant degree in other areas, was found in both breasts in two patients. The 100 percent incidence of hyperplastic breast lesions in the women who died of extramammary malignancy strongly suggests a common systemic factor at work, causing or associated with both the carcinoma and the unusual end-organ activity in the breasts. Williams and Sommers found that men with adenocarcinoma of the lung had significantly higher incidence of breast hyperplasia as well as hyperplasia of the islands of the pancreas, benign prostatic hyperplasia, squamous metaplasia and more frequent hypertrophy of spermatogonia. These findings also suggest a common factor at work in the presence of malignancy and end-organ hyperplasia. Possibly, therefore, in these cases of lung cancer and associated gynecomastia, there is a common factor which caused both diseases.

Summary

Four cases are presented as examples to further document the association of lung cancer with gynecomastia. Several hypotheses concerning this relationship are explored, the major of which are that the lung tumor itself produces a substance causing hormonal change, that the presence of a tumor in the lung causes the lung to produce such a substance; that the lung tumor initiates a neural or neurocirculatory reflex resulting in specific end-organ responses; that the gynecomastia is in some way a nonspecific host response to stress or disease, and that the gynecomastia and lung tumor are together or separately manifestations of some unknown factor producing the neoplasia.

(The omitted figures and references may be seen in the original article.)

MYOCARDITIS*

Walter H. Abelmann MD† Boston, New Eng J Med 275(15, 17):832–834, 944–945, October 13, 27, 1966. Reproduced with the permission of the New England Journal of Medicine.

The historical evolution of concepts of primary diseases of the myocardium, including myocarditis, has recently been reviewed succinctly by Mattingly. Through careful post-mortem studies, Saphir called attention to the true autopsy incidence of inflammatory lesions of the myocardium, ranging from 3.4 to 9.3 percent. Increased alertness on the part of clinicians led to many reports of myocardial involvement by systemic disease, and also to recognition of acute primary myocarditis, largely of unknown etiology. Only recently has it become possible to identify many of the latter as viral. Coxsackie viruses of Group B have been especially associated with myocarditis, with or without pericarditis, initially mainly in the newborn infant and more recently also in the child and adult.

Pathology

There is scarcely an infectious disease—bacterial, rickettsial, spirochetal, viral, fungal or parasitic—that has not been associated with inflammatory lesions in the myocardium. Many cases of myocarditis accompany a systemic disease, and hence are considered secondary. Increasingly, the more frequent form of isolated or primary myocarditis is being identified as of infectious—usually viral—etiology. Morphologically, the lesions may be focal or diffuse, myocytolytic or interstitial, associated with mononuclear or polymorphonuclear infiltrates, and more rarely with granulomas. Only in rheumatic and parasitic carditis and in the rare tuberculous and syphilitic myocarditis may the lesions be specific. Thus, histologic examination of the heart only rarely permits an etiologic diagnosis, and myocardial biopsy generally has not been helpful. Wider use of the electron microscope and of immunofluorescence technics may make tissue examination more useful.

Myocarditis associated with infectious disease has variously been attributed to invasion and tissue damage by the infectious organism (such as a virus), toxic damage (for example, from diphtheria) or immune response (for example, rheumatic fever). The presence of other factors potentially responsible for myocardial lesions may make it difficult or uncertain to attribute a given myocarditis to a coexistent or recent infectious disease. Toxic or allergic myocarditis may be produced by sulfonamides, emetine, arsenic, sympathomimetic amines, digitalis glycosides or steroids, and is also seen in metabolic disturbances such as uremia. Rare is the patient who succumbs to infectious disease without having been exposed to multiple therapeutic agents, often including one or more capable of producing myocardial lesions. Furthermore, the work of Selye and his associates has raised the possibility that focal myocardial lesions are related to stress in general and are thus nonspecific companions of severe illness.

Although nonspecific myocardial lesions may thus lead to a false pathologic diagnosis of specific myocarditis, Saphir has proved that unless multiple blocks from both atria and ventricles are examined, myocarditis may be overlooked. On the other hand, when seen in hearts with coronary disease, focal infiltration and necrosis may be falsely attributed to ischemia.

Clinical Significance of Myocarditis

In striking contrast to the frequency with which inflammatory lesions in the myocardium may be seen at careful post-mortem examination stands the rarity of clinical myocarditis, and especially the rarity of evidence of impairment of cardiac function. The frequency with which the diagnosis of acute myocarditis is considered or made clinically is largely a function of the frequency with which initial and serial electrocardiograms are taken in patients with acute infectious disease or with acute illness of unknown etiology. Overt clinical heart failure is rare in acute myocarditis, irrespective of the etiology. This is borne out most clearly in the two forms of acute myocarditis proved to be followed by chronic heart disease: rheumatic and

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Chagasic myocarditis (*Trypanosoma cruzi*). In consideration of the wide prevalence of the chronic form of these diseases, the acute disease is observed but infrequently and only rarely accompanied by heart failure.

If it is accepted that pathologic "acute myocarditis" is frequent and that, with the exception of routine use of electrocardiography and special interest, clinical "acute myocarditis" is rare, it follows that the disease is often silent clinically. It further follows that to the extent that acute myocarditis may have late sequelae, an etiologic connection with the unrecognized earlier acute disease may not be made. This is borne out by the medical history of rheumatic heart disease and of chronic Chagas disease. It remains unknown, however, to what extent acute myocarditis from other causes may lead to chronic heart disease. Notwithstanding considerable speculation along these lines on behalf of the pathogenesis of chronic idiopathic primary myocardial disease, no definite connection has been established.

How is the absence of clinical manifestations in acute myocarditis to be understood? The heart, like many other organ systems, has a large organ reserve. Myocarditis accompanying acute infections has usually been described as focal, affecting but a fraction of heart muscle. Unless such focal lesions produce conduction disturbances or major arrhythmias, their functional effect is likely to be negligible. Additional cardiac loads, however, might lead to congestive heart failure. Among these one might mention anemia, fever, alcohol, hypervolemia, hyperthyroidism, work and pregnancy. Such additional cardiac loads, then, might also lead to additional pathologic damage. These considerations lead to the concept that a cardiotropic infectious agent in combination with either cardiac stress or a second agent capable of damaging the heart or the presence of pre-existent heart disease may be necessary to produce clinical heart failure.

Diagnosis of Clinically Manifest Myocarditis

To the clinician, acute myocarditis may present one or more of the following dominant pictures: heart failure; atrial or ventricular arrhythmia; heart block; cardiac arrest; sudden death; abnormal electrocardiogram; pericarditis; or pulmonary or systemic emboli. When myocarditis is associated with acute rheumatic fever or diphtheria, it is usually recognized. Other forms of myocarditis are often not recognized clinically, even in the presence of signs of cardiac involvement, frequently because they are overshadowed by manifestations of the primary, systemic disease, including peripheral circulatory failure (shock).

Persistent fever, palpitation, tachycardia out of proportion to the temperature and occasionally bradycardia may alert the physician to cardiac involvement. Inasmuch as myocarditis generally affects both ventricles, biventricular heart failure may result; yet right ventricular failure usually dominates the clinical picture. Orthopnea, exertional dyspnea or cough and fatigue are suggestive. Cardiac examination may reveal cardiomegaly, irregularities of the heartbeat, gallop rhythm and occasionally murmurs of mitral or tricuspid insufficiency. The pulse may be thready, and blood and pulse pressure relatively low. In the distended jugular vein the A or V wave may be prominent. There may be basilar moist rales or evidence of pleural effusion. The liver may be palpable and tender. Occasionally, the pain of acute distention of the hepatic capsule may suggest acute hepatitis or cholecystitis. Peripheral edema or ascites may be present; in children facial edema is seen. Low cardiac output may result in cyanosis. True chest pain is rare, but aching or sensations of tightness of the chest are not infrequent. Pleuropericardial pain and the friction rub of pericarditis are usually associated with relatively mild subepicardial myocarditis; when there is evidence of congestive heart failure as well, cardiac tamponade should be suspected.

When myocardial failure is not overt, elevation of the venous pressure, cardiomegaly and pulmonary congestion on roentgenograms of the chest and a good response to a mercurial diuretic may be most useful diagnostic adjuncts. The electrocardiogram may show atrial or ventricular irritability, arrhythmias, conduction disturbances, elevation or depression of ST segments and flattening or inversion of T waves. Many of the electrocardiographic findings by themselves are not necessarily abnormal, or may be related to metabolic or electrolyte disturbances, to autonomic imbalance or to drugs.

Overt or covert heart failure occurring in the course of acute infectious disease may be attributed to myocarditis only if no other heart disease is present. The existence and pathophysiologic role of

acute myocarditis superimposed upon pre-existing heart disease cannot be established clinically. Although serum glutamic oxalacetic transaminase and lactic dehydrogenase may be elevated in acute myocarditis, in the presence of hepatic congestion such elevations are nonspecific. The myocardial isoenzyme of lactic dehydrogenase has been found to be elevated in some cases of acute myocarditis. This may be a helpful test, but will not differentiate myocarditis from ischemic damage.

The etiologic diagnosis will have to consider the many possible causes of myocarditis, and diagnostic tests must be guided by the general systemic manifestations.

Diagnosis of Subclinical Myocarditis

The frequency with which pathological evidence of myocarditis is found in patients who have died of infectious disease without clinical evidence for cardiac involvement and the high incidence of abnormal electrocardiograms as the only cardiovascular abnormality suggest that, in the majority of cases, acute myocarditis is not accompanied by grossly abnormal cardiac function. At present it is uncertain if any useful purpose is served by establishing a diagnosis of subclinical myocarditis. Acute myocarditis usually reaches the stage of maximal cardiac involvement early in its course. On the other hand a serious arrhythmia, cardiac arrest or sudden death may be the first clinical manifestation and might have been prevented or treated more successfully if the preceding subclinical process had been recognized. Diagnosis of the subclinical case is occasionally desirable in planning of therapy or determination of length of convalescence. A suspicion of myocarditis should suffice to disqualify certain key personnel temporarily from work or duty; runners, divers, pilots and astronauts are examples. Detection of subclinical myocarditis may also lead to further definition of the clinical spectrum, course and prognosis of myocarditis, and may ultimately be important if specific therapy becomes available. Possible approaches will be explored briefly. Their application would be largely limited to infectious diseases known to be associated with potential cardiac involvement. They might also be useful, however, in the evaluation of a subject who on routine screening examination, as for employment, school health, insurance or preoperative evaluation, reveals an arrhythmia or an electrocardiographic abnormality that may be either innocent or indicative of myocarditis, without cardiac symptoms, signs or radiographic abnormalities. Often, such patients give a history of recent infection.

An exercise test may reveal dyspnea, excessive increase in heart rate, extrasystoles or occasionally a specific sign of myocardial failure such as diastolic gallops, multifocal ventricular extrasystoles or pulsus alternans. Levander-Lindgren recently stressed the value of electrocardiograms taken during or after exercise and in the standing position in bringing out arrhythmias. The response of central venous pressure to exercise can be measured quite simply but is rarely tested outside the hemodynamic laboratory. An abnormal rise reflects an increased right ventricular diastolic pressure and constitutes presumptive evidence of early right ventricular failure. Excessive hepatojugular reflux or rise of venous pressure upon compression of the liver may indicate hepatic congestion, even when the resting venous pressure is normal and the liver is not palpable. The response of the blood pressure to the Valsalva maneuver may also be used as a bedside test for myocardial failure, as described by Gorlin, Knowles and Storey. Finally, borderline abnormalities in the responses to these tests may reveal themselves as abnormal for a given subject upon serial testing. Even a resting electrocardiogram considered within normal limits may, upon comparison with later tracings, appear abnormal in retrospect, and a normal cardiac silhouette may be clearly larger than that seen a month later on a comparable film.

Therapy

To the extent that the agents responsible for myocarditis respond to specific therapy, their identification is important, although the question whether the myocardial process can be altered by specific therapy has often not been answered. The treatable diseases that should always be kept in mind include rheumatic fever, diphtheria, tuberculosis and bacterial and fungal infections in general. When acute myocarditis appears isolated and primary, the causal agent may well be a virus, but its identification from nose and throat washings or feces, or by neutralizing antibodies in convalescent-phase serum, can usually not be completed until after recovery. In the absence of specific therapy, this remains academic at present, with the possible exception of psittacosis, lymphogranuloma venereum, vaccinia and atypical viral pneumonia, a presump-

tive diagnosis of which can usually be made clinically.

When heart failure is present the usual therapeutic approaches should be considered and may be effective. These include bedrest, oxygen, cardiac glycosides, restriction of sodium intake and diuretics.

Unfortunately, bedrest as a therapeutic agent in the treatment of congestive heart failure has become neglected in recent years, partly because of the recognition of risks such as thromboembolic complications and perhaps partly because of the increasingly popular early ambulation after acute myocardial infarction. Yet a good case for organ rest can still be made in patients with acute inflammatory lesions of the myocardium. The possible effects of bodily activity upon acute experimental myocarditis in the mouse have recently been explored in this laboratory. In acute myocarditis due to *Trypanosoma cruzi* spontaneous activity was found to be decreased in the absence of outward signs of illness or heart failure. Forced activity in the form of swimming resulted in increased heart weight, increased numbers of parasites and increased infiltration and necrosis in the myocardium, and in increased mortality. Similar studies of mice infected with Coxsackie A–9 virus, strain 13, gave evidence of greater replication of virus in heart tissue after forced exercise. These findings have led us to be quite conservative in the prescription of activity for patients in the acute and convalescent stages of myocarditis with heart failure. They raise the question whether heavier types of activity such as manual labor and competitive sports should not also be restricted in all patients with evidence of acute or convalescent myocarditis, even in the absence of heart failure.

There is some disagreement about the efficacy and risk of cardiac glycosides in the treatment of heart failure in acute myocarditis. Clinical experience, especially in children, clearly establishes the value of digitalis, which is effective primarily by its positive inotropic action upon the heart muscle, but perhaps also by its peripheral action. There is a greater tendency to digitalis toxicity, however, in this group of patients, primarily in the form of ventricular irritability. Thus, it is advisable to use only the short-acting cardiac glycosides such as ouabain or digoxin, to digitalize slowly, to give submaximal doses and to monitor the electrocardiogram. In the absence of heart failure digitalis is not recommended.

Steroids, of therapeutic value in rheumatic carditis, have not been proved superior to acetylsalicylic acid. Yet experienced clinicians consider them the best treatment of severe rheumatic carditis, but they should probably be reserved for such situations. Steroids have also been used in nonrheumatic carditis, and in uncontrolled series have been found clinically effective. On the other hand, Lerner has recently shown that in experimental Coxsackie-virus myocarditis, steroids increase virus replication in the heart. Thus, it may be wise to limit their use to the treatment of severe, life-threatening myocarditis not responding to other therapy.

Antiarrhythmic drugs such as quinidine and procaine amide may be useful in controlling arrhythmias, especially ventricular irritability. They are myocardial depressants, however, and should be used conservatively. Complete heart block with Stokes-Adams attacks is an indication for electric pacing by means of either a transvenous or an implanted cardiac pacemaker.

Finally, the preventive value of vaccinations and immunizations, and of early antibiotic therapy of infectious disease must be mentioned.

Summary and Conclusions

Acute myocarditis may be secondary to almost any infectious disease or may occur as a primary isolated disease. Increasingly, primary myocarditis of unknown etiology is being identified as viral, and is most often due to the Coxsackie virus. In most cases the clinical course of acute myocarditis is benign. In severe forms, and especially in the presence of additional cardiovascular loads or damage, congestive heart failure may occur, usually responding to conventional therapy. Cardiac arrhythmias and disturbances of conduction are frequent and may threaten life. Sudden death may be the first sign of acute myocarditis. The argument for recognition and study of subclinical myocarditis is presented.

(The references may be seen in the original article.)

MEDICAL ABSTRACTS

RATIONAL NORMOBARIC AND HYPERBARIC OXYGEN THERAPY

Herbert A. Saltzman MD, Ann Intern Med 67(4):843–852, Oct 1967.

Modern technology permits a remarkably varied dosage of oxygen for patients whose requirements are no longer met by exposure to the inspired tensions of oxygen found normally in air. A review of known mechanisms indicates predictable circumstances in which aerobic requirements of the body or an organ can be met readily by modest increases in the Po2 of inspired gas, can be met only by exposure to more than 1 atm of oxygen pressure, or cannot be satisfied by any practical inhalational exposure. Toxicity from exposure to high tensions of oxygen imposes severe constraints upon therapy currently. In addition sufficient time has not elapsed as yet to evaluate definitively the value of hyperbaric oxygen in clinical medicine.

PATHOPHYSIOLOGY OF ACUTE FALCIPARUM MALARIA—I. CORRELATION OF CLINICAL AND BIOCHEMICAL ABNORMALITIES

CAPT Marion H. Brooks MC USN, MAJ John P. Malloy MC USA, et al., Amer J Med 43(5):735–744, Nov 1967.

This prospective study of naturally acquired falciparum malaria in twenty-six American soldiers was performed in Vietnam. All subjects were nonimmune, receiving weekly chemoprophylaxis, and studied during their initial clinical episode of malaria. The sequential changes in clinical and laboratory abnormalities are defined and correlated. Clinical observations which warrant increased emphasis include the high incidence and long duration of orthostatic hypotension and splenomegaly. In addition to previously reported laboratory abnormalities, severely ill patients had hyponatremia, reversal of the urinary sodium to potassium ratio, increased urinary aldosterone excretion and urinary osmolality markedly exceeding that of serum during hyponatremia. There was a positive correlation between the clinical illness and laboratory abnormalities. A hypothesis in which a decrease in *effective* circulating blood volume play a central role is presented.

HUMAN CYTOGENETICS: A BRIEF REVIEW AND PRESENTATION OF NEW FINDINGS

Walter E. Nance MD and Eric Engel MD, J Bone Joint Surg 49–A(7):1436–1454, Oct 1967.

Human cytogenetics is a young, but exceedingly vigorous, science that began, for all practical purposes, in 1956 when Tjio and Levan made the startling discovery that the correct chromosome number in man is forty-six, not forty-eight as believed for nearly fifty years. Their observation was made possible by simple technical innovations that permitted short-term culture of human cells and preparation of metaphase plates in which the morphology of the chromosomes was suitable for detailed examination and enumeration. In the frenzied decade of discovery since that event, many classes of chromosomal abnormalities, long recognized in lower organisms, have been found to occur in man also and to be the apparent cause of many important clinical syndromes and disease states. Some of these syndromes will be seen by the orthopaedist who treats congenital defects. Other disorders are less severe, but they may have important orthopaedic findings. The purpose of this lecture is to present briefly examples of the major types of chromosome anomalies in man that have been recognized up to the present time.

NEUROCUTANEOUS SYNDROMES

Meyer A. Perlstein MD and Minnie O. Perlstein MD, Pediat Clin N Amer 14(4):933–948, Nov 1967.

Neurocutaneous syndromes include a group of developmental abnormalities involving the skin or subcutaneous tissues and neural structures. They are generally genetic and heredofamilial. They may be present from birth or may not become manifest until childhood or even puberty. This definition excludes acute infections of the skin with neurologic manifestations, such as herpes zoster, and general systemic diseases which may develop both neurologic and cutaneous symptoms, such as diabetes. It also excludes diseases which are primarily dermatologic with only rare neurologic symptoms, such as cancer of the skin with brain metastases, and diseases in which the stigmata involve

the appendages or skull without a specific dermatologic involvement, such as acrocephaly with syndactyly. Most of these neurocutaneous syndromes are due to abnormalities in either ectodermal or mesodermal development or both. Although over 40 of these syndromes have been described, the majority occur rarely, and this discussion is limited to the most frequently observed neurocutaneous syndromes.

PHYSIOLOGICAL BASIS FOR PSYCHOSOMATIC MEDICINE

Edward J. Kollar MD and Michael Alcalay AB, Ann Intern Med 67(4):883–895, Oct 1967.

Late nineteenth-century and early twentieth-century medical thought was dominated by a concept of cellular disease that held that disorganization of cellular processes led to structural changes and, thus, to physiological or functional disturbances. Although this concept is still preeminent, present medical thought also includes the notion that cellular disease and structural change may occur as a consequence of functional disturbance. A variant of this later idea is the psychosomatic approach which holds that psychological conflict or stress can cause functional impairment that in turn may produce pathological or structural changes in the cells and the tissues. The purpose of this paper is to trace the development of these concepts and, particularly, to examine critically the adequacy of the pathophysiological mechanisms that have been postulated as basic to psychosomatic processes.

DENTAL SECTION

PERSONNEL AND PROFESSIONAL NOTES

108TH ANNUAL SESSION OF THE AMERICAN DENTAL ASSOCIATION

Washington, D.C., became the dental capital of the nation during the first week of November as 23,000 ADA members, their families and guests converged on the nation's capital to attend the 108th Annual Session of the American Dental Association.

RADM F. M. Kyes, DC USN, Chief, Dental Division, Bureau of Medicine and Surgery, served as Navy delegate to the House of Delegates of the ADA and RADM E. C. Raffetto, DC USN, Inspector General, Dental Division, Bureau of Medicine and Surgery, acted as alternate delegate.

Participation by dental officers of the U.S. Navy was very much in evidence in the essay, clinic, lecture, film and exhibit program of the annual session.

VADM ROBERT B. BROWN MC USN, HONORED

The highlight of the International College of Dentists' banquet at the Washington Hilton Hotel on 29 October 1967 was the conferring of Honorary Fellowship in the International College of Dentists to VADM Brown, Surgeon General, USN. The Honorary Fellowship was conferred in recognition of Admiral Brown's many contributions to the welfare of dentistry. Among these are his services with the Armed Forces Institute of Pathology and National Institutes of Health which have afforded him many opportunities to work closely with the dental branch of the healing arts in teaching, research, and in his role as a consultant.

RADM ROBERT S. DAVIS DC USN (RET), HONORED

RADM Robert S. Davis, DC USN, Retired, was the recipient of the William John Gies Award at the meeting of the American College of Dentists held October 28 and 29 in Washington, D.C.

Admiral Davis was awarded the William John Gies Award for exceptionally meritorious service to the dental profession while serving as Chief of the Dental Division of the U.S. Navy, June 1943 to July 1945. His efforts resulted in improved dental service for personnel of the Navy and Marine Corps of the United States.

Among those honored by induction into fellowship in the American College of Dentists were: CAPT E. C. Penick, DC USN, CDR J. D. Enoch, DC USN, and CDR G. M. Bowers, DC USN.

PREVENTIVE DENTISTRY PROGRAM

RADM F. M. Kyes, DC USN, served as moderator for a panel discussion of one entire day de-

voted to Preventive Dentistry sponsored by the American College of Dentists. The objective was to correlate philosophy, information and technical procedure into a practical application for the entire dental profession.

Other naval dental officers participating in the panel were: CAPT Frank D. Grossman, DC USN, Head, Preventive Dentistry Section, Bureau of Medicine and Surgery, who discussed the Navy's program of using stannous fluoride in orthodox prophylaxis and self-administered programs in the prevention of dental caries and periodontal disease.

CAPT Gordon H. Rovelstad, DC USN, Officer in Charge, NDRI, Great Lakes, discussed the Navy's progress in developing a vaccine for combating dental caries.

NAVAL DENTAL SCHOOL HOSTS GOLD FOIL OPERATORS

The American Academy of Gold Foil Operators held its 15th Annual Session at the Naval Dental School, Bethesda, Maryland, on October 27 and 28. CDR Julian J. Thomas, Jr., of the Naval Dental Corps, chairman of the local arrangements committee, reported 215 registrants, including 5 members and guests from Canada.

NAVAL DENTAL OFFICERS PRESENTING TABLE CLINICS AT THE ANNUAL SESSION OF ADA

CAPT S. O. Bartlett
CAPT F. P. Beall, Jr.
CAPT H. B. Marble, Jr.
CDR R. E. Austin
CDR J. D. Enoch
CDR P. E. Farrell
CDR T. A. Garman
CDR E. P. Klecinic
CDR N. K. Luther
CDR W. C. Moffitt
CDR H. Muller, III
CDR H. C. Pebley
CDR V. A. Pinkley
CDR S. J. Sachs
CDR J. J. Thomas, Jr.
CDR R. A. Vessey
CDR T. L. Whatley
LCDR D. M. Anderson
LCDR R. L. Corio
LCDR J. D. Crawford
LCDR J. Holcomb
LCDR S. V. Holroyd
LCDR J. P. Luton
LCDR R. P. Morse
LCDR E. H. Plump
LCDR N. D. Wilkie
LT O. Duren

Naval Officers Presenting Essays

CAPT P. J. Boyne
CAPT P. F. Fedi, Jr.
CAPT F. D. Grossman
CAPT W. H. Hagerman, Jr.
CAPT W. E. Ludwick
CDR J. R. Elliott
CDR J. J. Lawrence, Jr.
CDR J. J. Thomas, Jr.
LCDR E. O. Lindgren, NC USN

CAPT V. J. Niiranen, DC USN, served during the Annual Session as President of the American Academy of Maxillofacial Prosthetics. CAPT J. F. Bucher, DC USN, assumed his role as Secretary-Treasurer of the American Academy of Endodontics. In addition to several presentations at the ADA meeting, CAPT G. H. Rovelstad, DC USN, continued as Assistant Secretary of the International Association of Dental Research. CAPT H. J. Towle, DC USN, Head, Professional Branch, Dental Division, Bureau of Medicine and Surgery, served as essayist at the Ninth National Conference on "Disaster Preparedness."

RADM E. C. Raffetto, DC USN, participated in the ADA sponsored closed circuit television program. Admiral Raffetto's presentation emphasized the U.S. Navy's contribution to this year's annual session scientific program.

JOINT ARMED FORCES DENTAL EXHIBIT WINS FIRST AWARD

The Joint Armed Forces Exhibit, "Dental Support in Southeast Asia," won first place in Government Agency Category of scientific exhibits at the 108th Annual Session of the American Dental Association, Washington, D.C., 29 October–2 November. Fourteen exhibits were entered in this category. CDR R. A. Wooden, DC USN, Head, Audio-Visual Department, Naval Dental School, National Naval Medical Center, Bethesda, Maryland, is the Navy representative on the Joint Armed Forces Dental Exhibit Committee.

FIELD DENTAL EQUIPMENT EXHIBIT

On Sunday, 29 October 1967, at 1200, in front of the Sheraton-Park Hotel in Washington, D.C., the Commandant of the Marine Corps, General Wallace M. Greene, Jr., the Surgeon General of the Navy, VADM Robert B. Brown, MC USN, and the Assistant Chief of the Bureau of Medicine and Surgery (Dentistry) and Chief, Dental Division, RADM Frank M. Kyes, DC USN, attended ceremonies which opened a display of field dental equipment used to support and provide dental treatment for Fleet Marine Forces in the field.

Among other notables attending the opening of the display were RADM E. C. Raffetto, DC USN, Inspector General, Dental, RADM M. E. Simpson, DC USN, Fleet Dental Officer, CINCLANT, RADM F. J. Fabrizio, DC USNR, CAPT V. J. Niiranen, DC USN, Fleet and Force Dental Officer,

CINCPACFLT, and CAPT W. E. Ludwick, Staff Dental Officer, Headquarters, U.S. Marine Corps.

PREVENTIVE DENTISTRY EXHIBIT

The Navy's Mobile Preventive Dentistry Unit was on display throughout the annual session. The exhibit was of particular interest to the thousands of civilian dentists because of its adaptability to preventive dentistry programs for school children in the United States.

NAVAL RESERVE OFFICERS' SEMINAR

The annual Naval Reserve Officers' Military Seminar was held in the Shoreham Hotel on Monday, 30 October 1967. RADM Frank M. Kyes, DC USN, Assistant Chief of the Bureau of Medicine and Surgery (Dentistry) and Chief of the Dental Division, spoke on "Recent Changes in the Naval Dental Corps." LCDR Henry Luning, USNR, official briefing officer of Naval Reserve Manpower Center, Bainbridge, Maryland, presented "New Concepts in Mobilization."

Local arrangements for the Reserve meeting, the Marine and Navy field support dental unit display and Navy officers' reception in the Palladian Room was accomplished by CAPT R. F. Tuck, DC USNR, Head, Reserve Branch, Bureau of Medicine and Surgery.

NEW CORRESPONDENCE COURSE FOR DENTAL OFFICERS

The Naval Dental School announces a *revised* correspondence course for dental officers, *Advanced Speeds in Operative Dentistry,* NavPers 10420–A, which supersedes the earlier course, NavPers 10420. The new course is based on the revised textbook, *Advanced Speeds in Operative Dentistry,* NavPers 10481–A, written at the Naval Dental School and illustrated by 48 2- by 2-inch transparencies.

Applications for enrollment should be submitted on Form NavPers 1550/4, with appropriate changes in the "To" line, and forwarded via official channels to the Commanding Officer (Code E43), Naval Dental School, National Naval Medical Center, Bethesda, Maryland 20014.

The course consists of three (3) assignments, and is evaluated at nine (9) retirement points, creditable only to personnel eligible to receive them under current directives governing retirement of Naval Reserve personnel. Personnel who completed NavPers 10420 may receive full credit for taking this revised course.

Since the earlier course was published, research has provided new information in such areas as the effects of advanced speed cutting instruments on pulp, dentin, and enamel; the design characteristics of cutting instruments; the effects of sound on the auditory apparatus; and even the design of cavity preparations. This second edition of the course therefore includes up-to-date information on the development of advanced speeds, the equipment available, the physical factors associated with the use of this equipment and the control of these factors, the biological reactions to advanced speeds, and the application of advanced speeds to current practice.—Naval Dental School, NNMC, Bethesda, Maryland.

NURSE CORPS SECTION

PEDIATRIC NURSING COURSE FOR NURSE CORPS OFFICERS

A short course in pediatric nursing was held at the Naval Medical School, Bethesda, Maryland from 13 November through 17 November 1967. The objective of the course was to update the participants' knowledge of current trends and techniques in Pediatric Nursing. The curriculum for the program was developed by Nurse Corps staff of the Naval Medical School and the Nursing Division, Bureau of Medicine and Surgery. An attempt was made to parallel pediatric nursing courses currently being offered in academic programs. Speakers from the Medical Corps, Navy Nurse Corps, Army Nurse Corps, U.S. Public Health Service, civilian health institutions, and National Institute of Health were included in the program. Some of the topics presented were:

The Hospitalized Emotionally Disturbed Child
The Battered Child Syndrome and Child Abuse Reporting
Emergency Pediatric Nursing Care

Nursing Care: Plans and Practices
Diseases of the Neuromuscular Skeletal System
Surgical Management of the More Common Congenital Anomalies
Nursing Care of the Child with Carcinoma
Infectious and Communicable Diseases in Children

Nineteen Nurse Corps officers from fifteen Naval Medical Activities attended the course. An attempt will be made to publish excerpts of some of the presentations in future issues of the U.S. Navy Medical News Letter.

The opportunity to attend short courses is available to each eligible Nurse Corps officer upon submission of an individual request via the Commanding Officer to the Bureau of Medicine and Surgery, Nursing Division, Department of the Navy, Washington, D.C. 20390.

Information concerning future short courses for Nurse Corps officers at the Naval Medical School may be obtained from Chiefs of Nursing Service at each naval command.

MILITARY NURSES PRESENT PANEL DISCUSSION AT MILITARY SURGEONS' CONVENTION

The Nursing Section of the Association of Military Surgeons of the United States presented a panel discussion on "Innovations in Federal Nursing" during the Association's recent convention. CAPT Veronica M. Bulshefski, NC USN, Director, Navy Nurse Corps, presided and LCDR Phyllis J. Elsass, NC USN was moderator. Panel members represented the five federal services and their respective topics were:

MAJ Pearl Tucker, NC USAF—"Aerospace Nursing".

Mary Jane McCarthy, R.N., Director Nursing Service, Veterans Administration—"How the Veterans Administration, a Large Consumer of Nursing Manpower, Contributes to Increasing the Nation's Nursing Resources".

LCOL Patricia Murphy, ANC, USA, MUST Project Officer, OTSG, USA.

LCOL Sara Lundy, ANC, USA, Nursing Methods Officer, Hospital Management, Engineering Branch, OTSG, USA, "MUST is a Must".

LT Patricia Fellenz, NC USN, Station Hospital, New London, Connecticut—"Nurses Under the Sea".

Mrs. Louise Anderson, Nurse Director, Public Health Service, Chief, Nursing Department, Clinical Center, NIH, Bethesda, Maryland—"The Clinical Specialist".

Approximately 225 nurses attended the panel.

RESERVE SECTION

ACDUTRA—PART I

In approaching this subject it is best to answer the question—Who must take ACDUTRA? Article H–4202 (1) of the Bureau of Naval Personnel Manual answers this quite clearly.

"Active duty for training is required for personnel attached to or associated in pay status with Selected Reserve units. Active duty for training is also authorized for a limited number of other personnel including those who are performing appropriate duty, associated in non-pay status with Selected Reserve units, attached to Specialist units, and those in the Active Status Pool. It is not authorized for personnel in inactive or retired status except as provided in article H–3602 (9)."

This first paragraph covers "the who" must take ACDUTRA quite well but does not say anything about "the why" take ACDUTRA. A good question and all too frequently answered by "you get retirement points." This is true but it has missed the target as to the true reason and value of two weeks spent on active duty for training.

Each Naval Reservist in a Ready Reserve status has a mobilization (MOB) billet assigned by the Naval Reserve Manpower Center at Bainbridge, Maryland. In accordance with the time frame on the mobilization orders, this is the billet to which a Naval Reservist will report in the advent of a national emergency or mobilization. What does this billet entail? Therefore, when and where feasible, it is strongly recommended that ACDUTRA be taken in an environment related to the MOB billet assigned thus familiarizing yourself with its requirements. This is particularly so where the billet requires a familiarity with administrative procedures

as these procedures are subject to change; what may have been correct in the past may no longer be so.

If the planned ACDUTRA is in one of our Naval Hospitals and if singularly qualified in a particular aspect in the field of medicine, nursing or paramedical training, the opportunity is a golden one to impart this knowledge to the active staff. The academically inclined medical or nurse corps officer can be of invaluable aid to the active staff in the teaching program by offering to assist in conferences and clinical instruction.

As with most things in life, one reaps what one sows and ACDUTRA can be a most rewarding and fruitful tour of duty or it can be "just another tour of duty."

This is the first of two articles dealing with ACDUTRA. The second will deal with how to apply and special things to consider (such as uniform, travel and other points contained in the aforementioned BuPers Article).

PREVENTIVE MEDICINE SECTION

MYCOPLASMA PNEUMONIAE INFECTIONS IN UNIVERSITY OF WISCONSIN STUDENTS

A. S. Evans, V. Allen and S. Sueltmann, Amer Rev Resp Dis 96(2):237–244, Aug 1967.

In a previous study of University of Wisconsin students admitted to the infirmary from 1953 to 1960 with acute infection of the lower respiratory tract antibody rises to *Mycoplasma pneumoniae* were demonstrated in 24.2% using fluorescent antibody techniques. Antibody rises to other respiratory pathogens were found in an additional 21.5% for a total of 45.7% of known etiology. *M. pneumoniae* has also been an important cause of pneumonia in the military and in civilians in a community setting.

The present paper extends the Wisconsin study from 1960 to 1965 using isolation and complement-fixation diagnostic methods. The scope of the study has been enlarged to include acute upper respiratory infections and acute pharyngitis and tonsillitis. The results indicate that this pathogen is important in lower but not in upper respiratory disease in the young adult, that mycoplasmal pneumonia occurs in 4- to 5-year cycles, and that tetracycline therapy may modify the course of clinical illness but does not eradicate the organism from the throat.

Materials and Methods

The study population consisted of 378 University students admitted to the infirmary with acute respiratory infections from the fall of 1960 through June 1965. Diagnostic studies for *M. pneumoniae* were carried out in 88% of infections diagnosed as pneumonia or pneumonitis and in about half of those with other acute syndromes of respiratory disease.

Cultural techniques: Agar medium was made up with slight modification after the method of Chanock et al; broth medium and agar medium with a broth overlay (diphasic medium) were prepared following the technique of Grayston et al.

Throat swabs in transport medium, sputum specimens, and nasopharyngeal washings were received for isolation. Nasopharyngeal washings were cultured the same day as collected or after storage at 70°C for up to five years; throat swabs and sputum specimens were cultured the day of collection. One diphasic tube and two monophasic plates were inoculated with each specimen. Plates were sealed with cellophane tape and placed in plastic bags. All cultures were incubated at 37°C.

The agar plates were observed weekly by low power microscopy. Diphasic cultures were checked weekly for change in pH and subcultured onto agar plates, one plate for each culture. These plates were handled in the same manner as the original plates. The original plates and the 7-day subculture plates were observed weekly for four weeks, the 14- and 21-day subculture plates for three weeks.

Isolates were identified as *Mycoplasma pneumoniae* by colonial morphology, glucose fermentation, and beta hemolysis of sheep erythrocytes. Small typical colonies were seen on solid medium and sperule growth in broth. Color change in broth due to acid production was observed in 10 to 45 days, and hemolysis occurred in 16 to 24 hours.

Complement-fixation test: Antigen was made with the FH strain of *M. pneumoniae*. The procedure used was essentially that of Kenny et al, except that a gyrorotary shaker was not used and the pellet was washed with veronal buffer. The crude antigen was purified by means of chloroform-methanol-aqueous potassium chloride partition. The dilution of antigen for use was determined by block titration.

The modified Kolmer complement-fixation test was used with overnight fixation, and it was adapted to microtiter plates. Antibody titers were determined as the highest original dilution of the serum that gave complete fixation of complement.

Cold agglutinin test: Lennette's technique was used.

Observations

Clinical categories: The clinical diagnoses made on 2,549 University of Wisconsin students admitted to the infirmary from 1960 through 1965 included 1,145 students or 45% with syndromes of acute respiratory infection. Infectious mononucleosis in 417 students represented the most common clinical diagnosis accounting for 16.3% of total admissions and 36.4% of admissions for respiratory disease. Acute upper respiratory infections represented about 11% of the total and 24% of respiratory infections. The 216 admissions for acute pharyngotonsillitis represented 8.5 and 18.9% of total and respiratory admissions, respectively 69 of these patients, or 32%, had a streptococcal infection.

The category of acute lower respiratory infections (bronchitis, pneumonitis, and pneumonia) included 232 patients or 20.3% of 1,145 respiratory admissions from 1960 to 1965. In the previous 7-year period (1953 to 1960) this category represented 14.2% of respiratory admissions suggesting an increased importance of lower respiratory infections in the last 5-year period.

Etiology: In the period 1960 to 1965, 51.7% of 120 patients admitted with pneumonia or pneumonitis had infections identified as *Mycoplasma pneumoniae,* compared with only 26.2% of the 84 patients with pneumonia admitted from 1953 to 1960. Part of this increase may be due to improved diagnostic techniques but, on the other hand, the frequency of *M. pneumoniae* in acute bronchitis decreased from 16.7% in 1953 to 1959 to 4.9% in 1960 through 1965.

In contrast to the frequency of *M. pneumoniae* in association with lower respiratory infections was the relatively unimportant role played in upper respiratory disease. Here only one of 125 patients with acute upper respiratory infection was mycoplasma associated, and only four of 92 patients with acute pharyngotonsillitis (4.3%) were positive.

Persistence of organisms: The possible failure of tetracycline therapy to eradicate *M. pneumoniae* from the throat was tested in four patients with proved mycoplasmal pneumonia. Follow-up throat cultures taken 33 to 58 days after the first positive culture yielded *M. pneumoniae* in all. Routine therapy consisted of tetracycline therapy in usual dosage during the period of hospitalization (average 7.4 days) and the request that the student complete a 10-day period of therapy after discharge. It is apparent that tetracycline therapy has failed to eradicate the organism from the throat under these circumstances. Its persistence in convalescent carriers may contribute to the spread of infection, especially to close contacts or family members.

Efficiency of diagnostic methods: The complement-fixation test yielded a higher percentage of positive tests for *M. pneumoniae* than did cultural methods or isolation. Of 67 paired sera, 64% showed a 4-fold rise in titer as compared to a positive isolation rate of 44% from 115 patients. When comparisons were made only in 66 patients on whom both procedures were done, 64 were positive complement-fixation test and 53% by cultural techniques.

Epidemiology: The yearly number of admissions for pneumonitis to the University of Wisconsin infirmary varied from six to 47 in the period 1953 through 1965. Positive or *M. pneumoniae* varied from none in 1957 to 77% in 1960. A higher frequency of mycoplasmal pneumonia has been seen in the last six years subsequent to the introduction of improved diagnostic procedures. Both total and mycoplasmal pneumonia appear to have a cyclic pattern with a 4- to 5-year periodicity. It is also suspected that in "epidemic years," such as 1960 and 1965, adequate diagnostic techniques will iden-

tify *M. pneumoniae* in 75% or more of pneumonitis and pneumonia in young adults.

Monthly variations in the frequency of total and mycoplasmal pneumonia also occur with a peak for both in the late fall. Cases begin shortly after school starts in September, reach a peak in October, then continue high through November and December. With Christmas vacation, they drop off as students go home; on their return cases again occur then decrease throughout the rest of the school year.

Analysis of the housing accommodations showed similar distribution patterns for positive and negative cases of mycoplasmal pneumonia; a similar percent of each group lived in dormitories, private homes, or Greek letter societies. No evidence of an outbreak in any housing unit was seen. No sex predilection was observed within or between these two groups. The age distribution revealed no important variation from that expected in a college population.

Clinical features: The major signs and symptoms of 59 patients with laboratory-confirmed mycoplasmal pneumonia were very similar to those of 63 patients with pneumonia whose laboratory tests were negative for *M. pneumoniae*. Cough, headache, chills, and sore throat, in that order, constituted the most frequent complaints in both groups. Coryzal symptoms also occurred in this series in about equal frequency which is in contrast to an earlier study and also to the findings of others in which coryza is much more common in nonmycoplasmal pneumonia.

Fever was a nearly constant sign in both groups but temperatures over 102°F were present in 46.4% of the mycoplasmal cases and only 26.8% of the other pneumonias. When taken, most roentgenograms in both positive and negative cases of mycoplasmal pneumonia showed similar findings of patchy densities, especially in the lower lobes, extending down from the hilum. On physical examination an interesting observation was the presence of rash in one positive and three negative cases of mycoplasmal pneumonia.

Positive cases tended to be more severe than those in which mycoplasma was not identified.

Laboratory data: Leukocyte counts over 9,000 cm. occurred more than twice as commonly in the mycoplasma negative than in mycoplasma positive patients (19.8 versus 42.4%). Tests for cold agglutinins had been done erratically during hospitalization and convalescent serum was not available in this period. Therefore frozen sera from a group of 40 mycoplasma positive patients were carefully tested; 65% showed a 4-fold increase in titer or a single titer of 1:128 or higher.

Duration of hospitalization and treatment: Antimicrobial drugs were given on the basis of the severity of the disease to 63% of patients with positive mycoplasmal pneumonia and to 57% of those with negative mycoplasmal pneumonia. The average duration of hospitalization was 7.2 days in the positive and 6.4 days in the negative mycoplasmal pneumonia cases.

Discussion

From 1960 to 1965 admissions to the University of Wisconsin student infirmary for acute disease of the lower respiratory tract represented 9.1% of the 2,549 student admissions and 20.3% of the 1,145 students admitted with respiratory symptoms. Cultural and/or complement-fixation studies revealed an association with *Mycoplasma pneumoniae* in 51.7% of 120 patients with pneumonia and 4.9% of 41 patients with acute bronchitis. *M. pneumoniae* was uncommonly associated with acute upper respiratory disease; only 0.8% of 125 patients with acute upper respiratory infection and 4.3% of 92 patients with acute pharyngotonsillitis were positive. Thus, in the young adult, mycoplasmal infections serious enough to warrant hospitalization are almost exclusively associated with pneumonia and pneumonitis. When patients were studied using both cultural and serologic techniques, mycoplasmal infections accounted for about 70% or more of the acute infections of the lower respiratory tract in years of high prevalence. Follow-up cultures for *M. pneumoniae* on nine patients with mycoplasmal pneumonia were all positive on samples taken 23 to 58 days after the initial positive culture or roughly one to six weeks after the conclusion of tetracycline. This shows the failure of this drug to eradicate *M. pneumoniae* from the throats of such patients. The duration of the carriage state is unknown; in two patients a third throat culture was negative. The role of *M. pneumoniae* in the pathogenesis of chronic bronchitis and emphysema has not yet been explored. The present observations point to the possible implication of this agent in chronic pulmonary disease and the need for long-term follow-up studies, using deep lung specimens for culture, in patients with mycoplasmal pneumonia, especially in those who are heavy smokers.

In reviewing the yearly occurrence of pneumonia and of mycoplasmal infections over the 12-year-period, a cyclic pattern was seen. Every four to five years an increase in both total pneumonia and mycoplasmal pneumonia was evident. The peak years were 1954 to 1955, and 1960 to 1965. Monthly analysis revealed October, November, and January peaks. Epidemics of mycoplasmal infections have not been apparent in dormitories or other living units in the current study. Mycoplasmal infections are not highly contagious and transmission requires close and prolonged contact, such as in military recruits or in a family setting. Evidence of the familial spread of infection has been found in a University of Wisconsin graduate housing unit and in a community outbreak in La Crosse, Wisconsin. Excellent general reviews of mycoplasmal infections have recently been published by Chanock and by Hayflick and Chanock.

Analyses of the clinical features of mycoplasma-positive and mycoplasma-negative pneumonia failed to reveal important differential points in this series. As a rule mycoplasmal infections were somewhat more severe. In other studies, headache and fever were more common in mycoplasmal pneumonia than in other types of pneumonia, and rhinitis and gastroenteritis were less common. The differences were not sufficient to permit a differential diagnosis in an individual patient. An interesting feature among out patients was the occurrence of rash in one mycoplasma-positive and three negative patients. The occurrence of rash in primary atypical pneumonia was recognized by Finland, and a severe rash resembling erythema multiforme has recently been described by Copps in a case also complicated by hemolytic anemia. Rash of varied types has recently been observed in seven of 57 proved mycoplasmal infections in a community setting.

Cold agglutinins were found in rising titer or in a single high titer of 1:128 or more in 65% of 40 proved *M. pneumoniae* cases carefully studied. The percentage with cold agglutinins in other proved mycoplasmal infections, as reviewed by Chanock has varied from 33 to 76%. Contrariwise, 72 to 92% of patients with elevated cold agglutinin titers reported in the literature have been positive *M. pneumoniae*. Thus the cold agglutinin test provides a very useful though not highly sensitive indication of *M. pneumoniae* infection. When positive, it appears to be a reliable indicator of *M. pneumoniae* and of a guide to therapy.

The current study plus those of may other investigators clearly establish *M. pneumoniae* as a very important cause of pneumonia in young adults. Its role in chronic bronchitis should be carefully explored. The need for an effective vaccine needs further study in a disease of such relatively short duration. A vaccine might be useful when the morbidity rate is high as in military recruits or if this organism is shown to play a role in chronic respiratory disease. Encouraging early results with an inactivated vaccine have been reported by Jensen with the production of a growth inhibition antibody that appears to protect against experimentally induced disease.

EPIDEMIC ACUTE NEPHRITIS WITH REAPPEARANCE OF TYPE–49 STREPTOCOCCUS

B. F. Anthony, et al., Lancet II(7520): 787–789, Oct 14, 1967.

After an interval of 13 years, a second outbreak of acute nephritis developed at the Red Lake Indian Reservation in the summer of 1966, coincident with the reappearance of the original epidemic strain.

In 23 of 25 children with nephritis, a group A streptococcus (*S. pyogenes*) identified as type–49 was recovered from the patient and/or siblings. Since this strain was not recovered in studies of this population in 1964–65, this episode represents the first documented occurrence of type–49 at Red Lake in over a decade.

As in the original epidemic, pyoderma was much more common than clinically apparent pharyngitis in patients with acute nephritis, but the type–49 streptococcus was frequently isolated from nose and throat cultures as well as from skin lesions.

Serial observations of a healthy, preschool population at Red Lake during this period indicate that the epidemic strain first became prevalent in skin lesions and subsequently became widespread in the upper respiratory tract.

ETIOLOGY OF ACUTE UPPER RESPIRATORY DISEASE IN A COLLEGE STUDENT POPULATION

D. Rifkind, C. A. Pollack and H. R. Brettell, Amer Rev Resp Dis 96(2):309, Aug 1967.

During the calendar year 1964 the University of Colorado Medical Center student health service

served a population of 517 students. From a total of 1,687 patient visits (3.1 per student annually), 278 were for acute respiratory disease (0.34 per student annually). Throat swab specimens with paired acute and convalescent serum specimens were submitted from 72 of the 278 respiratory disease visits (25.6%). An infectious etiology was identified from 23 of the specimens (3.19%). These included rhinovirus, eight cases; parainfluenza, three cases; combined streptococcus A plus parainfluenza, one case; influenza A, two cases; respiratory syncytial virus, one case; herpes simplex, two cases; echo virus, one case; infectious mononucleosis, four cases; and streptococcus A, one case. From an additional 113 throat swab specimens submitted without paired sera, 11 infections (9.7%) were identified including rhinovirus, two cases; parainfluenza, one case; infectious mononucleosis, one case; and streptococcus A, seven cases.

No infections with *Mycoplasma pneumoniae, M. hominis* type one, or with the adenoviruses were detected.

Clinical findings were of little value in predicting the particular etiologic agent in any specific case.

EVALUATION OF THE EFFECTIVENESS OF LARGE-SCALE VACCINATION AGAINST INFLUENZA IN THE USSR

A. N. Slepuskin, et al., World Health Org Bull 36(3):385–395, 1967.

Vaccination is at present the only means of influenza control; so far, large-scale trials of live vaccine have been made mainly in the USSR. This paper discusses such a trial in persons above 12 years of age.

About 40% of the population of Smolensk and about 50% of the population of the nearby town of Jarcevo were vaccinated with live influenza vaccine in the winters of 1964–65 and 1965–66, and the incidence of influenza and other acute respiratory diseases in these towns during the 1965 epidemic and the 1966 pre-epidemic period was compared with that in nearby "control" towns. Most subjects were vaccinated two or three times with divalent A2–B vaccine in 1964, but some only once; in 1965–66, most subjects were vaccinated once with monovalent B vaccine and once with divalent A2–B vaccine.

Analysis of the incidence data for the towns involved, of more detailed incidence data for about 30,000 workers and 4,000 schoolchildren in Smolensk and one control town, and of a controlled trial involving about 4,000 persons, indicated that the large-scale vaccination led to a reduction in incidence of about 1.5- to 2-fold in 1965 and of about 2- to 3-fold in 1966. Limited serological studies in 1966 indicated that the reduction in incidence in the group studied was not 3-fold but 4-fold. The rather low protection offered by the 1964 vaccination may have been due to the low immunogenicity of the vaccine, or to the fact that the vaccine strains used did not correspond exactly to the influenza virus strains circulating in nature.

KNOW YOUR WORLD

Did You Know?

That South Korean doctors are fighting a parasitic disease, *Distomiasis*, a fluke infestation caused by eating raw fish that are vectors for the parasite?

An estimated 6 million people have this disease. No available medication has proven effective. The doctors are training junior Red Cross members to assist; each team consists of 40 to 50 young people who visit as many as 20 villages. Red Cross teams concentrate on alerting villagers to the danger of eating uncooked seafood, and instructing families in hygiene.[1]

That 16 cases of diphtheria, including four deaths, have occurred in the State of Alabama through 28 October 1967?

Two of the fatal cases lived on a farm. The other two fatal cases lived in Marengo County which is due west of Dallas County, the site of 11 of the earlier cases. The first recent death was in a 6-year-old unimmunized Negro child who expired on 26 October. The child's 42-year-old mother died the following day, both cases being clinically diagnosed as diphtheria and confirmed by bacteriologic examination. Among the nine siblings of the dead child, five have positive cultures for *Corynebac-*

terium diphtheriae from nasopharynx specimens, and two of the five also have positive cultures from cutaneous lesions. The father's cultures are negative to date. An immunization program is underway in the area.[2]

That in 1965 an epidemic of coccidioidomycosis involved 10 children within a 2-block area of a military housing project in southwestern United States?

Clinical illness was mild in all children; two had acute coccidioidal pneumonia; one had residual pulmonary granulomas. This is consistent with the usual benign course of primary infection with *C. immitis*. Residual pulmonary lesions (one child) may cause diagnostic dilemmas that frequently cannot be resolved without thoracotomy. Infection may have been contracted while the children were playing and digging in the immediate area of soil found to harbor *C. immitis*. Other factors may be invoked to explain the high proportion of coccidioidin reactors among the parents of these children with documented primary coccidioidomycosis. It is suggested that arthrospores may have been taken home on the children's clothing; wind-borne dissemination cannot be completely excluded due to the proximity of the positive soil to the involved household. A 5% incidence of coccidioidin skin reactors was found in the community; 73% of these reactors lived within the area of the epidemic.[3]

That in 1966, 20,040 isolations of salmonellae from humans were reported or a 3.9% decrease from the 20,865 for 1965 and 5.1% decrease from 21,113 reported in 1964?

Salmonella typhi-murium and *S. typhi-murium* var. *copenhagen*, as formerly, were the most common serotypes accounting for almost ⅓ of all isolations. A total of 7,709 recoveries of salmonellae from nonhuman sources were reported in 1966, or an increase of 12.8% over 1965 and 41.2% over 1964. This increase reflects an increasing interest in surveillance of nonhuman reservoirs of salmonellae.[4]

That the largest payment ever made for fish destroyed by pollution—$200,000—has been paid by the Mobile Chemical Company to the State of Florida?

In the spring of 1967, fish in more than 70 miles of Peace River were suffocated when a dike broke in the Mobile Chemical Company's setting basin, and phosphate mine tailings were dumped into the river, clogging the stream and suffocating aquatic life. Heavy summer rains helped wash the lethal chemicals down the river and into the sea—so the original estimated cost of $1 million for cleaning and restoring the river and restocking it with fish was reduced.[5]

That honeybees were brought to the United States from Europe in the early 1600s?

There are now some 5 million colonies in the 50 states, producing about 250 million pounds of honey a year and 5 million pounds of beeswax. The pollen preferences of honeybees are vital, because they handle more than 80% of all the pollination done by insects. If there were no honeybees, many plants would disappear. Their agricultural value, in addition to honey and beeswax, is estimated to average just under $100 per bee.[6]

That DDT, lindane, dieldrin and other chlorinated hydrocarbon pesticides are finding their way into eggs?

Although these pesticides are not recommended for use in and around poultry houses, Florida Department of Agriculture authorities discovered that 30% of all eggs sampled over an 18-month period were adulterated with those chemicals. "The tolerance for chlorinated pesticides in eggs is zero." Pesticides reach the eggs through the contamination of feed, water or environment. An examination of the birds' feed and water showed no source of contamination. Further detective work indicated that the so-called "safe" pesticides (carbamates and organic phosphates), which are recommended to control pests on poultry farms, were contaminated with the chlorinated hydrocarbon pesticides during the manufacturing or formulation process. As a result of findings, the State of Florida has set 100 parts per million as the maximum level for chlorinated pesticide contaminants in "safe" poultry pesticides. When 100 parts per million of DDT and BHC were added to the test pesticides, only trace amounts of residue were found in the eggs.[7]

That from 1950 to 1964, a total of 4,341 viral hepatitis cases occurred in Sydney, Australia?

The disease seems to be endemic in Sydney metropolitan area. This disease has usurped the place of typhoid fever in Australia and is considered an indicator of unsatisfactory community hygiene. Viral hepatitis for all Australia for the same period has been estimated in excess of 200,000 cases.[8]

That yaws eradication program in Haiti was begun 1950 and between July 1950 and July 1957,

a total of 3,611,737 persons were examined and 1,295,700 found to be suffering from all forms of the disease?

Between July 1957 and December 1965, about 1,529,026 persons were examined and 1,846 cases of infectious forms of yaws were reported; of these, 36 occurred in 1964 and 48 in 1965. In the past four years, the program has met various difficulties and was halted in July 1966.[9]

That brucellosis, tuberculosis, rabies and cysticercosis are the most serious diseases in the Central American Isthmus?

Bovine brucellosis exists in all countries of Central America with prevalence rates ranging from 0.09% in Honduras to 5.2% in Guatemala. In Costa Rica, El Salvador and Guatemala the incidence and economic losses are higher than Panama.

Bovine tuberculosis is low in all countries of Central American Isthmus; eradication is only plan recommended.

Rabies is well established in dogs in El Salvador, Guatemala, Honduras, and Nicaragua where in the last six years, 71 persons have died of rabies. The existence of 469 rabid dogs led to anti-rabies treatment of 8,257 persons in 1965, in which year 119,000 dogs, or 5% of the estimated total were vaccinated or destroyed.

A 3-year survey of cysticercosis in a slaughterhouse in each of six countries showed that 3% of all animals slaughtered (17,000 hogs) were confiscated for various reasons, and that of that number 11,628 (68%) were infected with cysticercosis. The economic loss was equivalent to more than US $500,000. Available statistics grossly understate the extent of the problem. Only Guatemala keeps statistics of human infections; from 1953–1966, 107 cases were recorded in two hospitals.[10]

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EDITOR'S SECTION

INDUSTRIAL ENVIRONMENTAL HEALTH WORKSHOP

Physicians and nurses, civilian or military, are invited to attend the Industrial Environmental Health Workshop at the Olympic Hotel, Ellis & Eddy at Taylor Streets, San Francisco, California, 94102, conducted by the Naval Ordnance Systems Command Environmental Health Center, Naval Ammunition Depot, Crane, Indiana, in cooperation with the Bureau of Medicine and Surgery on 27 February thru 1 March 1968.

Pertinent practical problems encountered daily in every naval industrial medical unit will be presented and discussed. Representatives from the Bureau of Employee's Compensation, Civil Service Commission, Bureau of Medicine and Surgery, U.S. Public Health Service, and Navy specialists in industrial medicine, safety and industrial hygiene will make up the lecturing staff.

This is an opportunity to learn the best way of managing the complex problems confronting the doctor and nurse daily in the naval industrial health unit.

For invitation and program announcement, contact LCDR George M. Lawton, MC USN, Naval Ammunition Depot, Crane, Indiana, 47522. (Autovon 551–1610 or 1611; Commercial Direct-Dial 812–854–1459.) Travel and per diem costs must be borne by the command to which attendees are attached.—Occupational Health Div, BuMed.

FELLOWSHIP TRAINING IN HEMATOLOGY

The Naval Hospital, Philadelphia, Pennsylvania has recently established an approved program for Fellowship training in the subspecialty of Hematology. The one year curriculum consists of formal graduate training in the clinical, laboratory and therapeutic aspects of hematological disorders en-

countered in clinical medicine, and in the special laboratory procedures and research methodology applicable to hematology. This program is supported by naval service members who are established investigators, by adequate paramedical and technical personal service from Jefferson Medical College and by excellent facilities and modern research equipment.

Prerequisite—Board eligible in Internal Medicine.

A limited number of billets are available. Applications should be submitted in accordance with BUMED INSTRUCTION 1520.10C immediately for training to commence in the summer of 1968. Applications for training commencing in July 1969 should be submitted prior to 1 July 1968.—Training Branch, BuMed.

SPACE AND ASTRONAUTICS ORIENTATION COURSE

The Space and Astronautics Orientation Course (SAOC) was established to provide personnel of the Navy Department a better understanding of space programs, space systems, their application to naval warfare, and the role of space sciences in national defense. The course is in consonance with the Navy's global mission and emphasizes the significant impact of astronautics on seapower. It is primarily designed for those senior officers who have not had the opportunity to gain knowledge of astronautics and current Space programs. A highlight of the course is a visit to the space vehicle launch and control facilities at Point Arguello Naval Missile Facility and Vandenberg Air Force Base.

Location: Naval Missile Center, Point Mugu, California

Duration of Course: Four days (Tuesday–Friday)

Convening Dates of Course:

16	January	1968
6	February	1968
26	March	1968
29	April	1968
21	May	1968
11	June	1968
9	July	1968
*19	August	1968
1	October	1968
29	October	1968
19	November	1968
10	December	1968

*For Reserve ACDUTRA Officers.

BUMED Quota: One for each class.

Deadline Date to Apply: Immediately for the 16 January and 6 February courses, and six weeks in advance for the remaining courses.

Eligibility: Lieutenant Commander and above. SECRET Security Clearance required.

In view of the shortage of travel funds for Fiscal Year 1968, only a limited number of officers can be authorized to attend these courses on travel and per diem orders chargeable against Bureau of Medicine and Surgery funds. Eligible and interested officers who cannot be provided with travel orders to attend at Navy expense may be issued Authorization Orders by their Commanding Officers following confirmation by this Bureau that space is available in each case. Requests should be forwarded in accordance with BUMED INSTRUCTION 1520.8 Series and comply with the deadline dates indicated above. All requests must indicate that a security clearance of SECRET (include basis, activity and date) has been granted to the officer requesting attendance, and if Bachelor Officer's Quarters are desired.—Training Branch, BuMed.

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